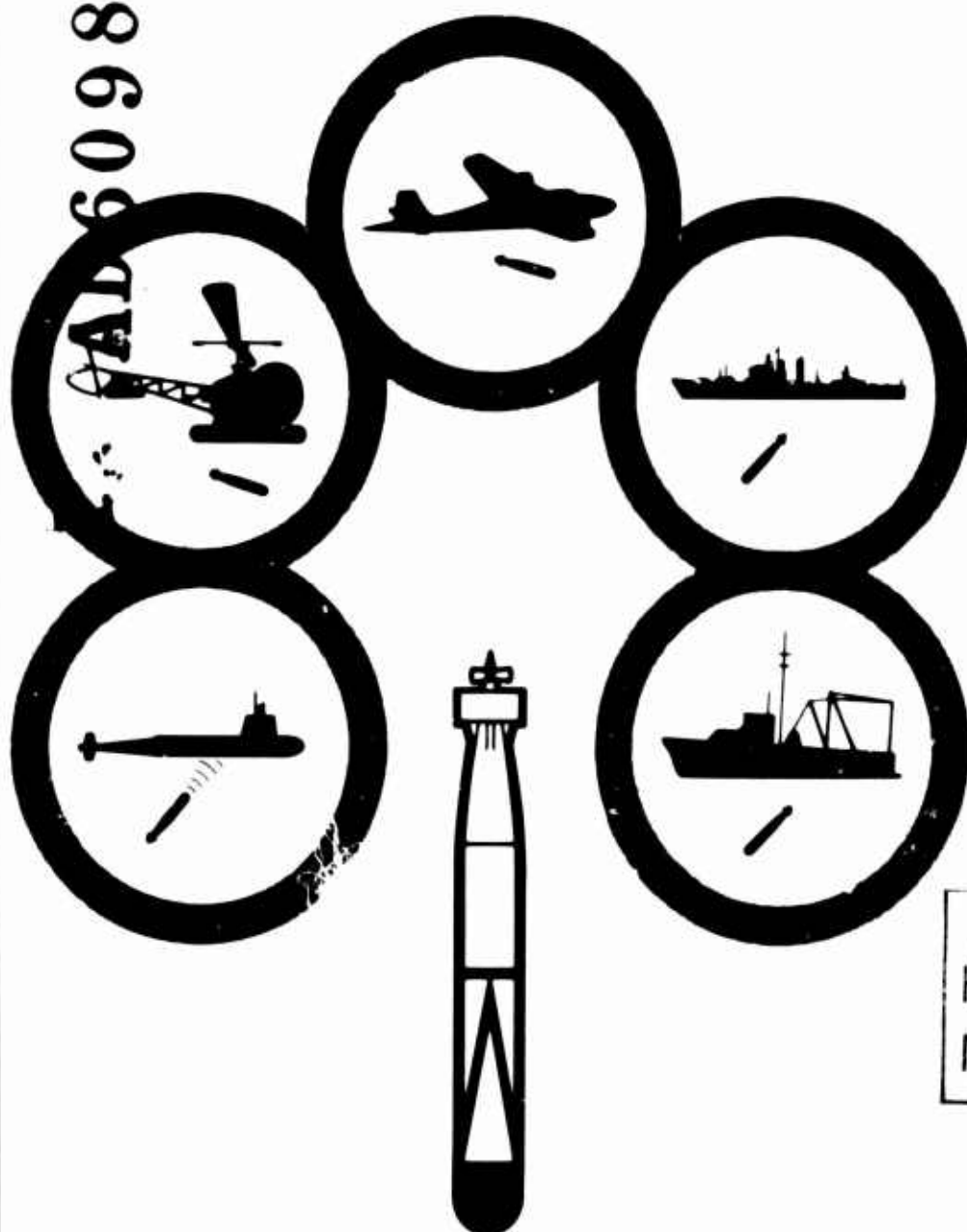


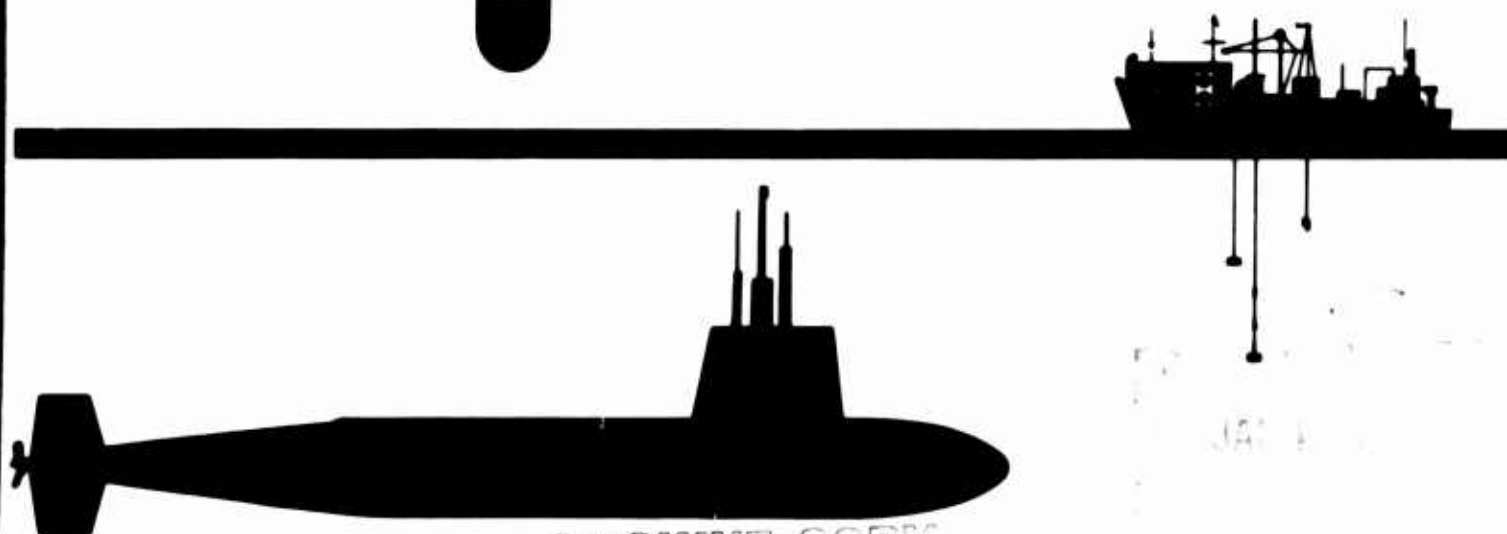
# LONG BEACH SEA RANGE

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U. S. NAVAL ORDNANCE TEST STATION

# U. S. NAVAL ORDNANCE TEST STATION

AN ACTIVITY OF THE BUREAU OF NAVAL WEAPONS

CHINA LAKE, CALIFORNIA

J. I. HARDY, CAPT., USN  
Commander

WM. B. McLEAN, PH.D.  
Technical Director

## FOREWORD

This report is one of a series whose purpose is to describe the underwater ordnance test facilities of the U.S. Naval Ordnance Test Station (NOTS), Pasadena, California.

The information contained in these reports is being disseminated to acquaint persons active in the development of underwater ordnance systems with the unique facilities that are available to assist them.

Other reports in this series are listed below:

<u>TITLE</u>	<u>REPORT NO.</u>
MORRIS DAM PROPULSION LABORATORY	NOTS TP 3559
MORRIS DAM BALLISTIC RANGE	NOTS TP 3560
YFU-44 DEEP DEPTH TEST FACILITY	NOTS TP 3561

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LONG BEACH

SEA RANGE

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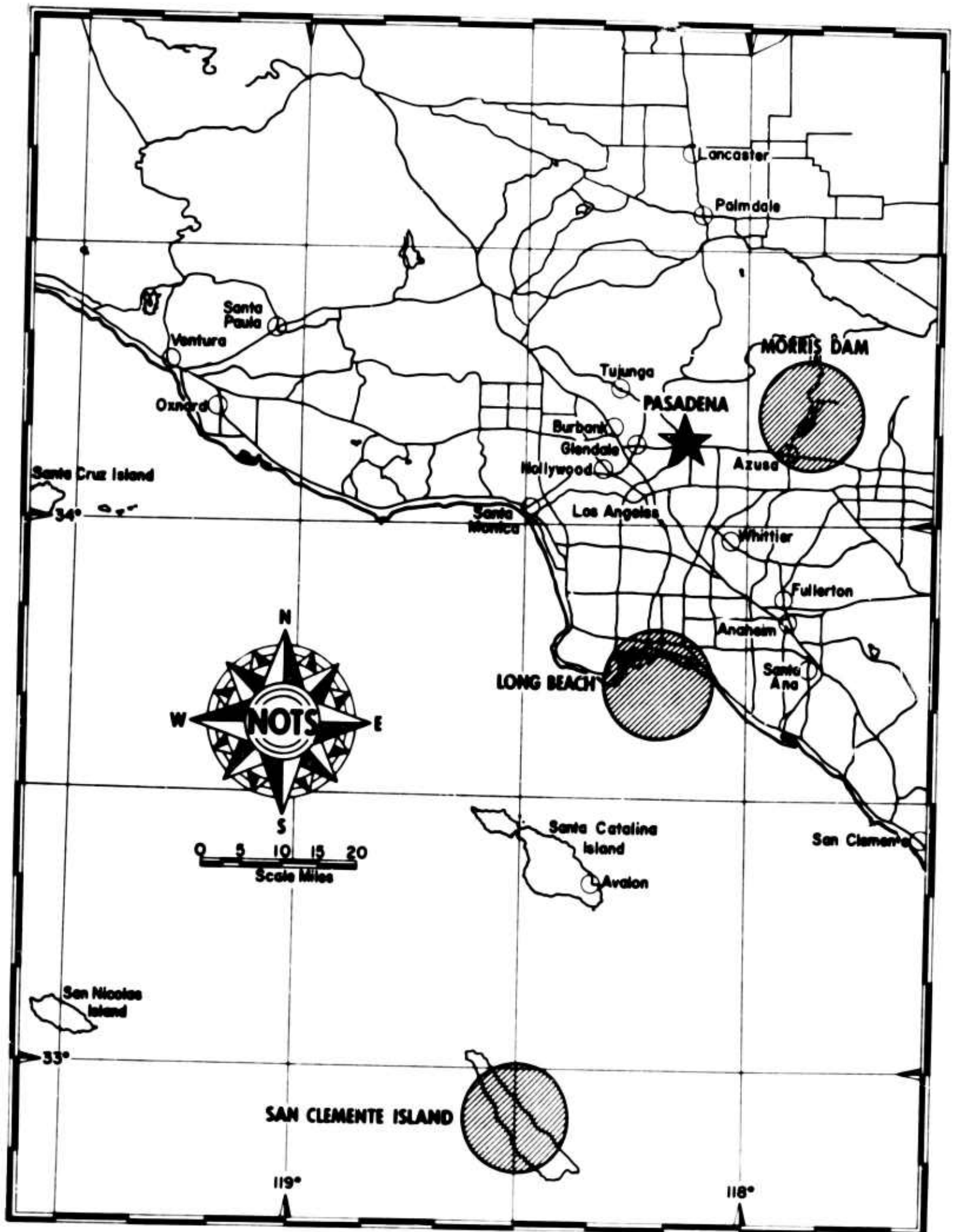
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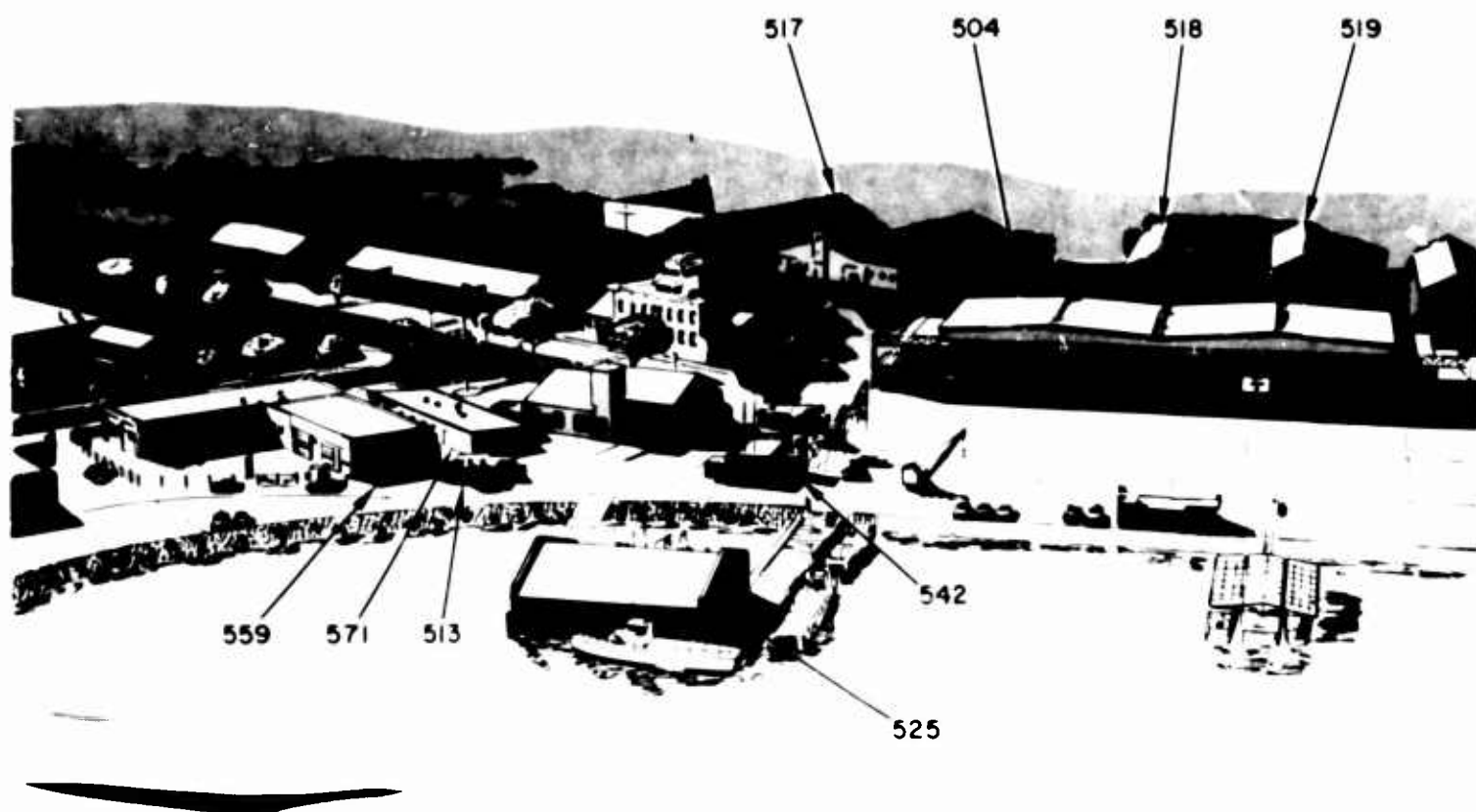


## INTRODUCTION

The Long Beach Sea Range covers a sea area of approximately 476 square miles off the coast of Long Beach, California. Supporting shore facilities are located at the Long Beach Naval Station. The location of these facilities with relation to other NOTS range facilities is illustrated on the map facing this page.

Fleet support is provided by specially equipped vessels assigned to NOTS and manned by Navy crews. Aircraft, submarines and additional surface vessel support is provided by Pacific Fleet when required for evaluation or proofing of weapons or weapon systems.

The primary purpose of the Long Beach Sea Range is the development testing and evaluation of underwater ordnance and ASW systems. In addition, underwater acoustic studies are conducted and underwater detection methods and equipment are tested and evaluated.



BUILDING 504 MISSILE PREPARATION  
 BUILDING 513 EXPLOSIVE STORAGE  
 BUILDING 517 SUPPLY AND EQUIPMENT  
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 BUILDING 518 MISSILE PREPARATION  
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BUILDING 519 PUBLIC WORKS SHOP  
 BUILDING 525 NOTS BOATHOUSE AND  
 DOCK AREA  
 BUILDING 542 NAVAL COMMAND CENTER  
 BUILDING 559 SEA RANGE OPERATIONS CENTER  
 BUILDING 571 EQUIPMENT STORAGE

Figure 1. Long Beach Sea Range Shore Facilities

## LONG BEACH SEA RANGE

The operations of the Long Beach Sea Range are controlled from NOTS shore facilities at the Long Beach Naval Station. Permanently attached to the Long Beach Sea Range are a number of vessels which have been modified for use in the testing of underwater ordnance systems and components.

A variety of weapon systems have been tested at the Long Beach Sea Range. Most of these weapon systems use the torpedo as the payload. These torpedoes may be launched from submarines, destroyers, airplanes, helicopters or auxiliary vessels. Torpedoes may also be launched as the payload of ASW missile systems.

### SHORE FACILITIES

Shore facilities are comprised of a number of buildings at the Long Beach Naval Station. These buildings are located in the same general area and are illustrated and functionally described in figure 1 and its accompanying legend. Operations at the Long Beach Sea Range are controlled from the Sea Range Operations Center and the Naval Command Center.

### SEA RANGE OPERATIONS CENTER

The Sea Range Operations Center is located in building 559 as illustrated in figure 2. Radio communications are maintained between the sea range operations office and fleet and mobile units. Building 559 also contains a photographic laboratory, electronics laboratory, communications repair shop, torpedo assembly area, machine shop and environmental test area.

**PHOTOGRAPHIC LABORATORY.** Extensive facilities are maintained for the acquisition of photographic data, processing of photographic material, and maintenance of photographic equipment. A large variety of high-speed motion picture and still cameras are available for use at the Long Beach Sea Range. An M45 Tracking Mount which accommodates a variety of high-speed motion picture cameras with various lenses, and a Bowen High Speed Camera are used to record in-space data, water entry angles and velocity data during missile and torpedo launchings.

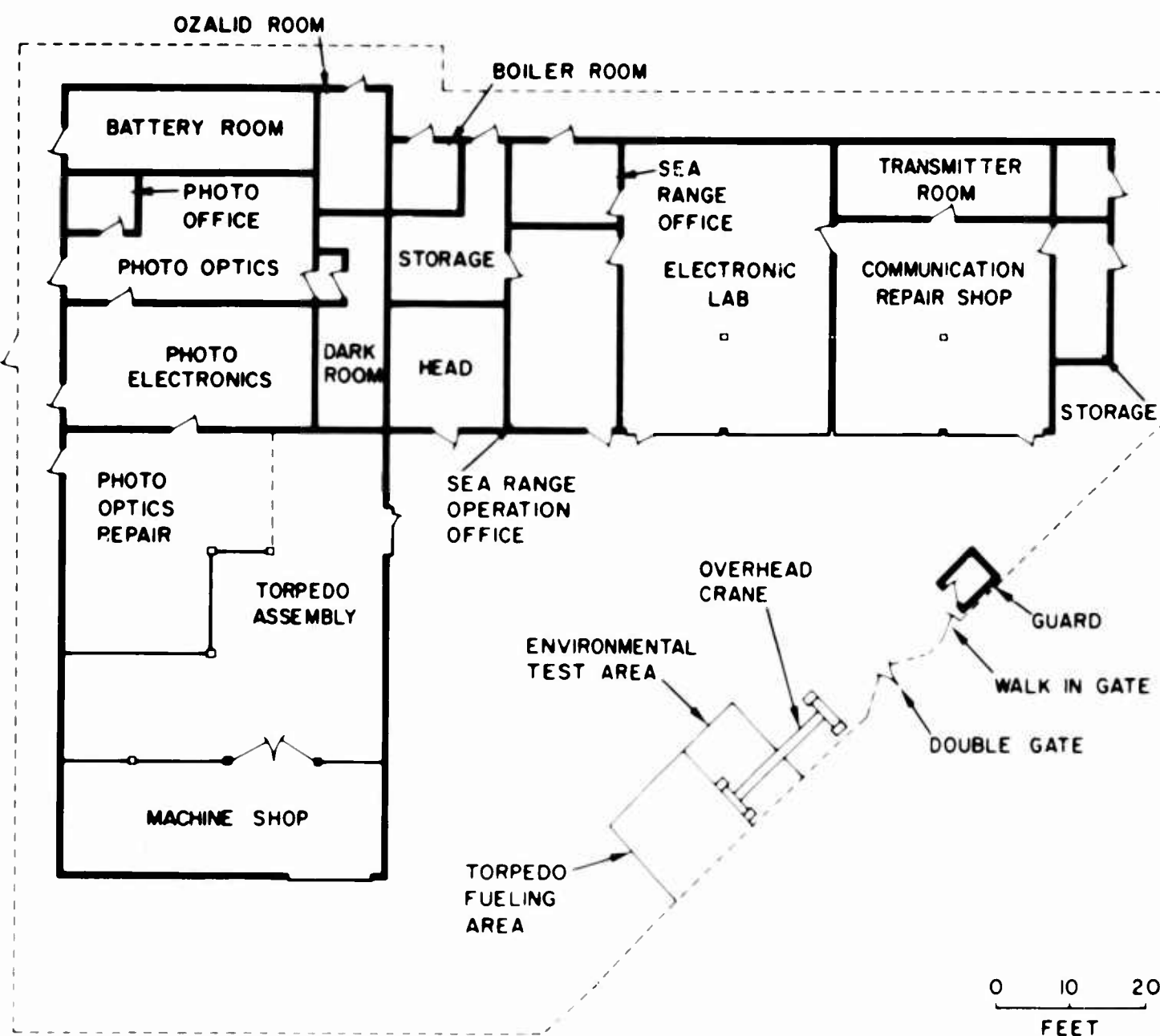


Figure 2. Building 559

**ELECTRONICS LABORATORY.** The electronics laboratory is equipped with up-to-date laboratory and standard test equipment for use in the alignment, adjustment and calibration of all electronic instrumentation systems used at the Long Beach Sea Range. Facilities are also provided for the preliminary processing of test data.

**COMMUNICATIONS REPAIR SHOP.** The Communications Repair shop is provided for the maintenance of all communications equipment used in the mobile and sea-going elements of the Long Beach Sea Range. Facilities and test equipment are provided for the calibration, test and repair of most types of mobile and shipboard communications equipment.

**TORPEDO ASSEMBLY AREA.** A specific area has been set aside for the assembly of torpedoes and other test vehicles. Hoists and other equipment are provided for assembly, installation of instrumentation, fueling and propellant loading.

**MACHINE SHOP.** A machine shop is maintained to fabricate parts required for test vehicles or test equipment required at the sea range. It is furnished with an assortment of equipment including milling machines, drill presses, lathes, metal saw, shaper, and tool and cutter grinders.

**ENVIRONMENTAL TEST AREA.** A special area has been set aside within Building 559 compound for the purpose of conducting salt water spray tests on test vehicles and associated hardware.

#### **NAVAL COMMAND CENTER**

The Naval Command Center, located in building 542, is the headquarters for U. S. Navy personnel assigned to operate and maintain Long Beach Sea Range vessels.

#### **SHIPBOARD FACILITIES**

The vessels presently assigned to the Long Beach Sea Range include three Target Boats, one Patrol Boat, four Torpedo Retriever Boats, the U. S. S. Butter-nut (AN-9), the Tug Boat (RV-1), and the YFU-44 Deep Depth Test Facility.

#### **NOTS TARGET BOATS**

The NOTS Target Boats are designated LCM-4, LCM-5 and LCM-6. A typical operation utilizing LCM-5 is illustrated in figure 3. LCM-4 and LCM-5 are 56 feet long and are used to provide simulated target echoes to test torpedoes,

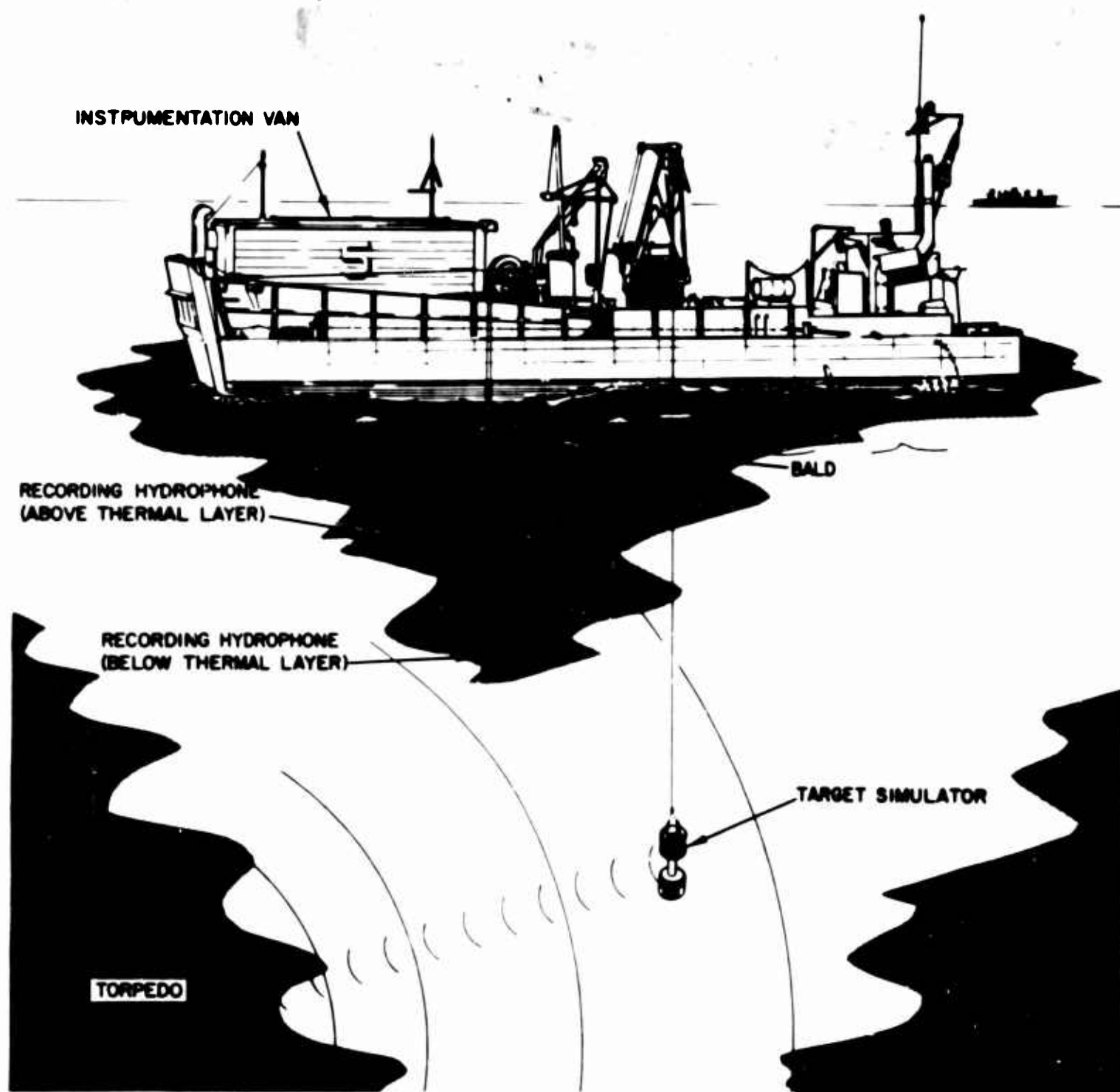


Figure 3. NOTS Target Boat

to monitor and record acoustic data during tests, and to track and locate torpedoes acoustically for recovery. LCM-6 is 49 feet long and is used as a torpedo launch boat, general work boat, and as a missile carrier.

**PROPULSION AND POWER.** LCM-4, LCM-5 and LCM-6 are each powered by a pair of Gray Marine 165-horsepower engines and have cruising speeds of 8, 8-1/2 and 10-1/2 knots, respectively. LCM-4 and LCM-5 are also equipped with 15-kilowatt diesel generators to provide ac power for instrumentation requirements and 5-kilowatt portable ac generators specially shock-mounted for ultra-quiet acoustic recordings.

**NAVIGATION AND COMMUNICATIONS EQUIPMENT.** All NOTS Target Boats are equipped with a Pioneer Magnesyn 2.5 inch compass. LCM-4 and LCM-5 both have 5-channel Motorola transceivers, Bendix DR-12 fathometers and ARC-27 decoders. LCM-6 uses portable communications equipment when required. LCM-4 and LCM-5 can also accommodate portable underwater telephone equipment when required.

**SPECIAL PURPOSE EQUIPMENT.** LCM-4 and LCM-5 are each equipped with NOTS developed BALD (Boat-mounted Acoustic Locating Device) underwater search equipment for tracking and locating submerged test vehicles, and with echo repeater equipment to simulate targets. LCM-4 has an instrumentation cabin containing recording equipment which records underwater acoustic data picked up by hydrophones in the water. LCM-5 has an air-conditioned instrumentation van containing equipment similar to that on LCM-4.

#### **NOTS PATROL BOAT**

The NOTS Patrol Boat is designated AVR-10. AVR-10 is 63 feet long and is used in patrol, supply and transport functions.

**PROPULSION AND POWER.** AVR-10 is powered by a pair of Gray Marine 165-horsepower engines and has a cruising speed of 13 knots. A 15-kilowatt diesel generator is installed on board for ac power requirements.

**NAVIGATION AND COMMUNICATIONS EQUIPMENT.** The Patrol Boat is equipped with a magnetic compass, a Mk 22 Mod 1 Sperry gyro compass, a Raytheon Pathfinder Model 1500 radar, and a depth recorder with an effective range from 0 to 600 fathoms. AVR-10 is also equipped with a multi-channel Motorola transceiver and an ARC-27 decoder. A hull-mounted transducer has been installed on AVR-10 for use in underwater telephone communications, when required.

## NOTS TORPEDO RETRIEVER BOATS

The NOTS Torpedo Retriever Boats are designated TRB-7, TRB-8, TRB-9 and TRB-11. Two of these boats, engaged in recovery operations, are illustrated in figure 4. TRB-7 is 72 feet long and TRB-8, TRB-9 and TRB-11 are 63 feet long. These boats are used to launch and retrieve torpedoes, to track and locate submerged torpedoes, and for patrol and transport functions.

**PROPULSION AND POWER.** TRB-7 is powered by eight Gray Marine engines which have a total of 1320 horsepower and has a cruising speed of 18 knots. TRB-8, TRB-9 and TRB-11 are each powered by a pair of Gray Marine 165-horsepower engines and have cruising speeds of 11, 12, and 11 knots, respectively. TRB-7 is equipped with two 15-kilowatt diesel generators to provide ac power for the boat and its instrumentation. The other TRB's are equipped with one of these diesel generators.

**NAVIGATION AND COMMUNICATIONS EQUIPMENT.** Each of the TRB's is equipped with a Raytheon Pathfinder Model 1500 radar, a Mark 22 Mod 1 Sperry gyro compass and a magnetic compass. Every TRB also has a Raytheon Model DE-715 fathometer, a multi-channel Motorola transceiver, a TCS transmitter and receiver, and an ARC-27 decoder. TRB-7, TRB-8 and TRB-11 have permanent hull-mounted transducers for underwater telephone communications.

**SPECIAL PURPOSE EQUIPMENT.** TRB-7 and TRB-8 are each equipped with a 7-1/2 horsepower winch with a 2000-pound capacity "A" frame, and a torpedo loading boom with a 750-pound capacity. TRB-9 is equipped with a 500-pound capacity winch and stern-mounted davits with a 250-pound capacity. TRB-11 has a 4-horsepower winch with a 1200-pound capacity "A" frame, and a torpedo loading boom with a 750-pound capacity. A BALD underwater search system is installed on all the TRB's.

## NOTS TUG BOAT

The NOTS Tug Boat (RV-1), figure 5, has been modified and equipped for underwater search, oceanography studies and target boat duties as well as towing operations.

**PROPULSION AND POWER.** The RV-1 is powered by a Cooper Bessemer diesel engine and has a cruising speed of 12 knots.



NEGATIVELY BUOYANT  
TORPEDO RECOVERY

POSITIVELY BUOYANT  
TORPEDO RECOVERY

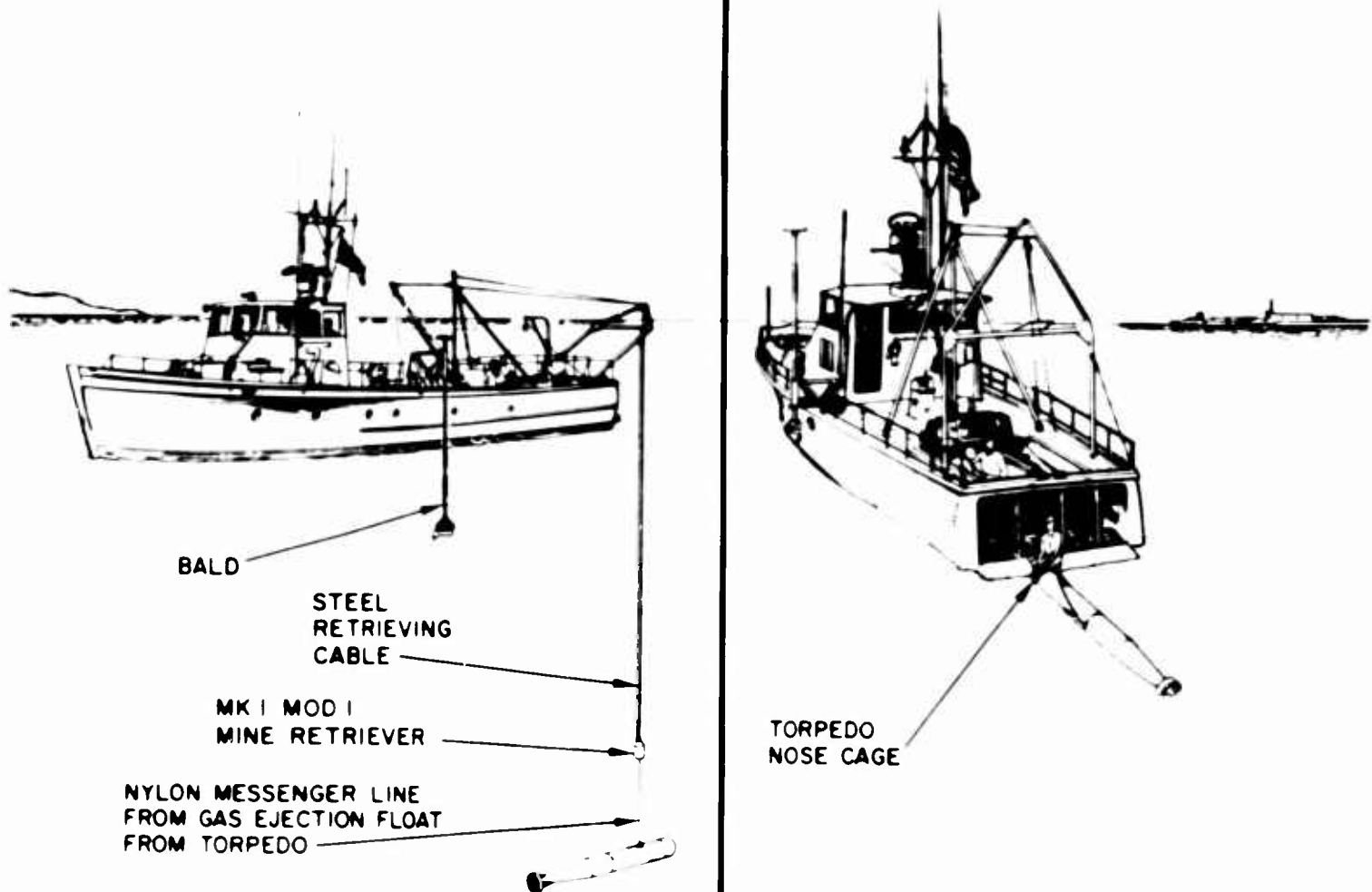


Figure 4. NOTS Torpedo Retriever Boats

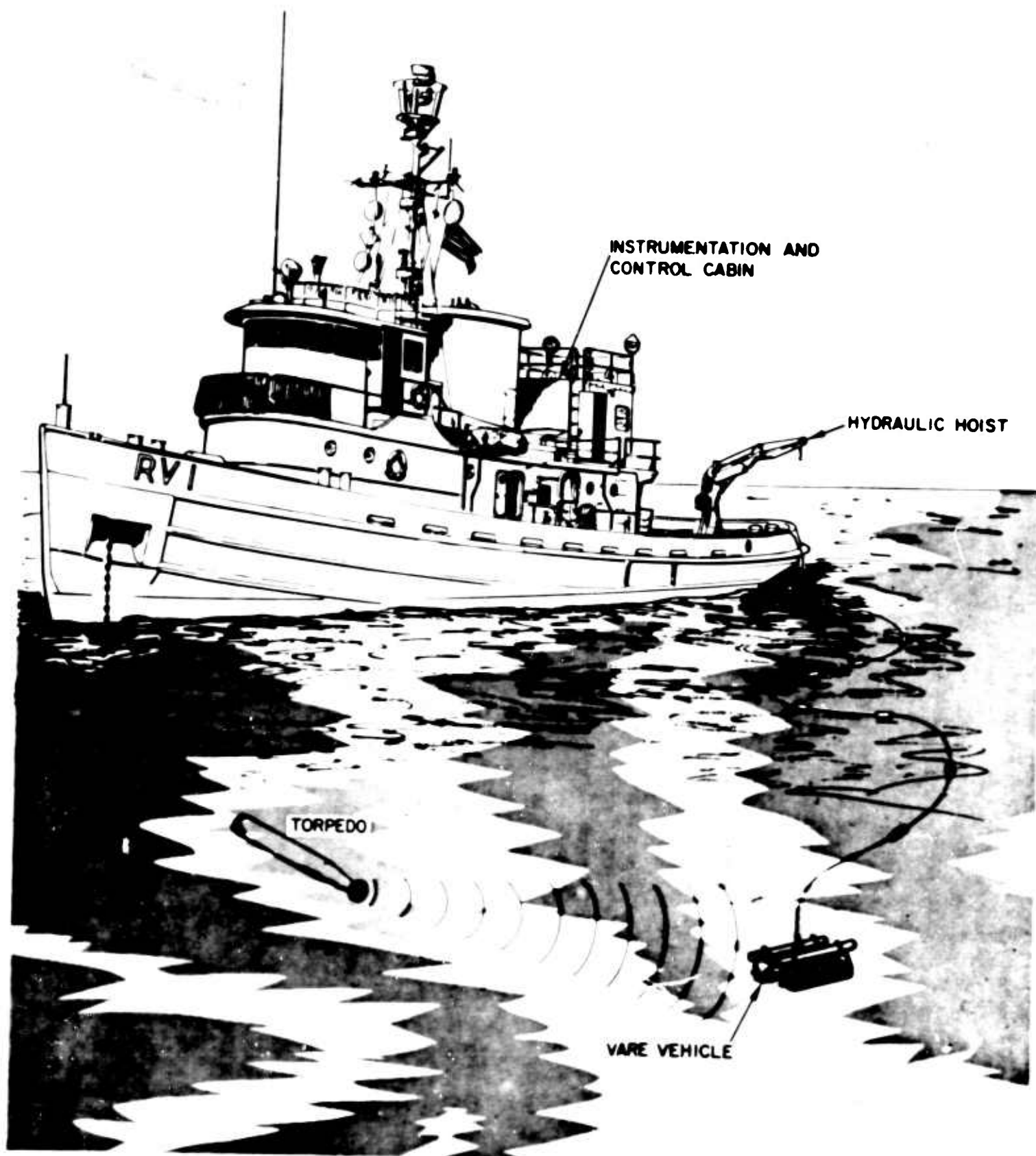


Figure 5. Tug Boat with Vare Underwater Vehicle

NAVIGATION AND COMMUNICATIONS EQUIPMENT. A Raytheon Pathfinder Model 1500 radar, a Sperry Mk 18 gyro, and an Electroacoustic fathometer (0 to 560 fathoms) are installed aboard the RV-1 as navigational aids. A Motorola multi-channel transceiver, a TCS transmitter and receiver, and an ARC-27 decoder are supplied for communications requirements.

SPECIAL PURPOSE EQUIPMENT. The most significant item of special equipment aboard the RV-1 is the Vane AN/SXQ(XN-3) Underwater Vehicle System. This vehicle has its own propulsion system which permits it to navigate as well as hover underwater. It is equipped with a remotely-controlled transistorized, closed-circuit television system for underwater observation. Additional instrumentation for the study of underwater sound and light phenomena is also provided. An instrumentation cabin, housing the shipboard electronics for the underwater vehicle system, is installed on the deck.

A 6000-pound capacity hydraulic crane and a capstan winch are installed on the fantail. A stern-mounted BT winch with 1200 feet of cable is also available.

#### USS BUTTERNUT

The USS Butternut (AN-9), figure 6, is one of the special purpose vessels assigned to NOTS. This vessel is used for torpedo launching, captive torpedo testing and various other assignments.

PROPULSION AND POWER. The AN-9 is powered by a 500-horsepower Westinghouse diesel-electric unit and has a cruising speed of 12 knots. A pair of 410-kilowatt, Westinghouse diesel-generators are installed to provide ac power for the vessel and its instrumentation requirements.

NAVIGATION AND COMMUNICATIONS EQUIPMENT. An AN/SPS-21D Radar Set, a Mk 14 gyro, a 7-1/2 inch Mk 1 magnetic compass, and an AN/UQN-1C fathometer (0 to 6000 fathoms) are provided as navigational equipment. Communications are carried out by means of a Motorola multi-channel transceiver.

SPECIAL PURPOSE EQUIPMENT. A cluster of three Mk 32 torpedo tubes is mounted amidships approximately 25 feet above the water line. Two Benson, 30,000 pound capacity winches are provided; one mounted forward, the other aft. A test cage is used to mount torpedoes which are to be captive-tested underwater. The test cage is lowered at controlled speeds to depths down to 3000 feet from a special winch mounted on the forward deck.

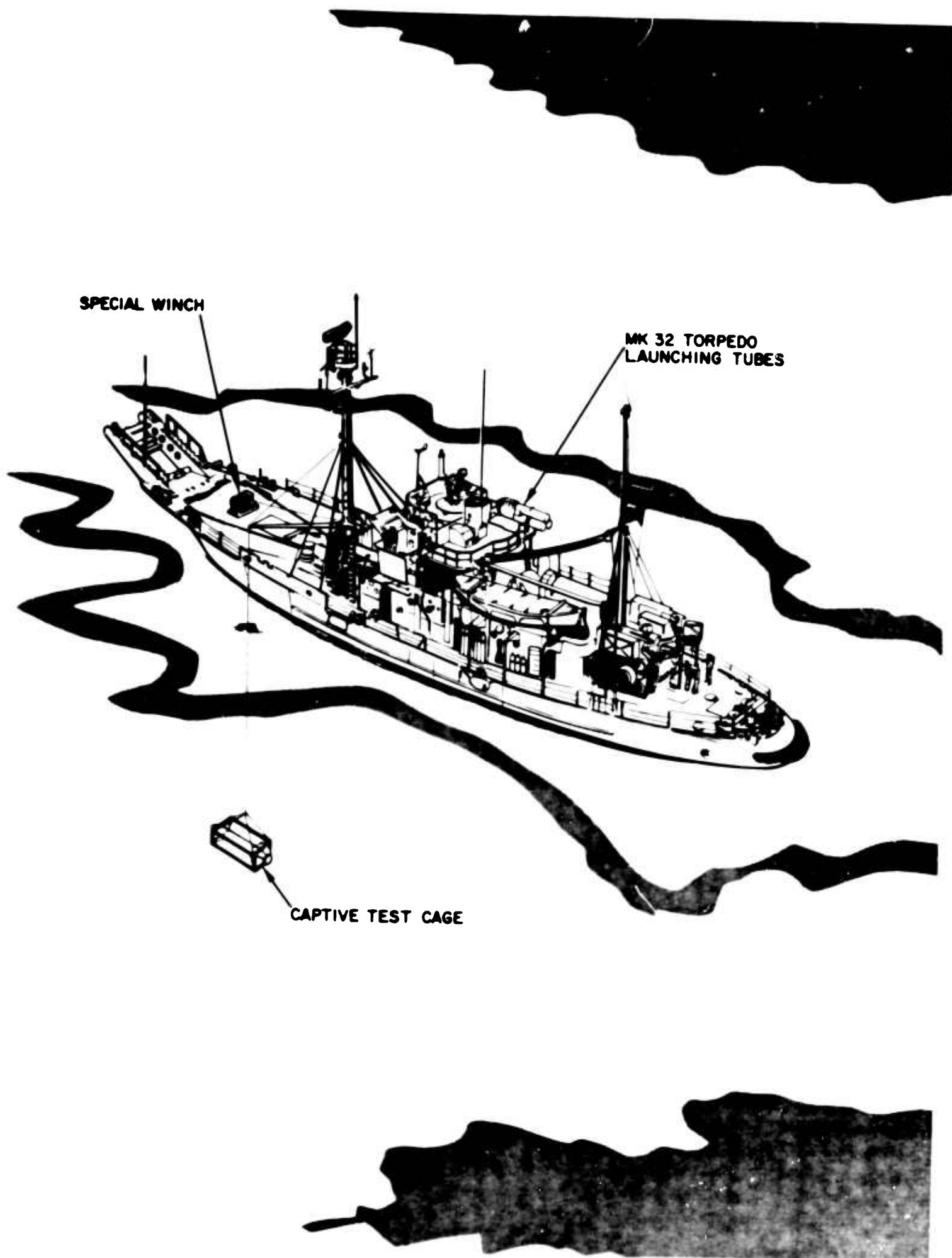


Figure 6. USS Butternut

## YFU-44 DEEP DEPTH TEST FACILITY

The YFU-44 Deep Depth Test Facility, figure 7, is a converted LCU with a submersible test mount which can be stabilized in three axes during underwater tests. This vessel is described in detail in NOTS TP 3561.

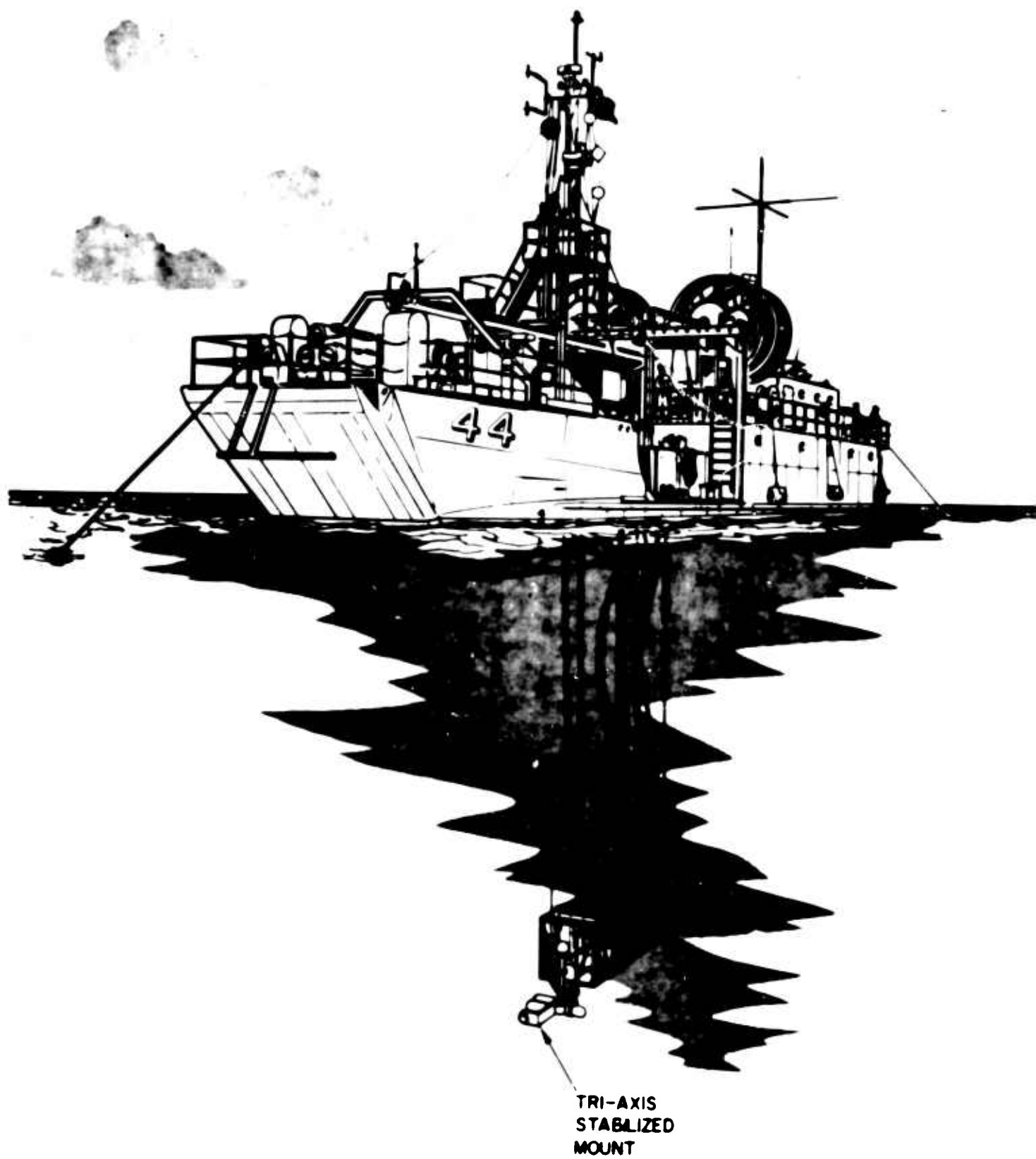


Figure 7. YFU-44 Deep Depth Test Facility

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